

THAT WHICH IS CLAIMED IS:

1. A millimeter wave filter for surface mount applications comprising:
at least one low temperature co-fired ceramic layer defining an outer filter surface; and
a plurality of parallel, coupled line millimeter wavelength hairpin resonators formed on the outer filter surface, each formed from a single stripline or microstrip and folded back upon itself into substantially parallel resonator lines.
2. A millimeter wave filter according to Claim 1, wherein each hairpin resonator is folded back upon itself into at least six substantially parallel resonator lines.
3. A millimeter wave filter according to Claim 1, wherein said at least one low temperature co-fired ceramic layer comprises alumina.
4. A millimeter wave filter according to Claim 1, wherein said at least one low temperature co-fired ceramic layer is about 5 to about 25 mils thick.
5. A millimeter wave filter according to Claim 1, and further comprising a ground layer formed opposite the outer filter surface.
6. A millimeter wave filter according to Claim 5, wherein said ground layer comprises one of a layer of gold or silver.

7. A millimeter wave filter according to Claim 1, and further comprising input and output terminals on a surface opposite the outer filter surface.

8. A millimeter wave filter according to Claim 7, and further comprising conductive vias extending through the at least one low temperature co-fired ceramic layer and interconnecting respective input and output terminals and a hairpin resonator.

9. A millimeter wave filter according to Claim 7, wherein said hairpin resonators folded back upon themselves form a millimeter wave filter that is about 320 mil x 320 mil.

10. A millimeter wave filter according to Claim 10, and further comprising a plurality of low temperature co-fired ceramic layers and interposed ground plane layers to form a multilayer, low temperature co-fired ceramic substrate board, and a plurality of millimeter wavelength hairpin resonators formed on the ceramic layers and each folded back upon themselves into parallel resonator lines.

11. A millimeter wave filter according to Claim 1, and further comprising a dielectric cover positioned over said outer filter surface.

12. A millimeter wave filter according to Claim 11, wherein said dielectric cover includes a metallized interior surface spaced from said hairpin resonators for generating a predetermined cut-off frequency.

13. A millimeter wave filter for surface mount applications comprising:

a dielectric base plate having opposing surfaces;

a ground plane layer formed on a surface of the dielectric base plate;

at least one low temperature, co-fired ceramic layer positioned over the ground plane layer and defining an outer filter surface;

a plurality of parallel, coupled line millimeter wavelength hairpin resonators formed on the outer filter surface, each formed from a single stripline or microstrip and folded back upon itself into substantially parallel resonator lines;

radio frequency terminal contacts forming input and output terminals and positioned on the dielectric base plate opposite the at least one low temperature co-fired ceramic layer; and

conductive vias extending through the at least one low temperature co-fired ceramic layer, ground plane layer and dielectric base plate and each interconnecting said radio frequency terminal contacts and a hairpin resonator.

14. A millimeter wave filter according to Claim 13, wherein each hairpin resonator is folded back upon itself into at least six substantially parallel resonator lines.

15. A millimeter wave filter according to Claim 13, wherein said low temperature co-fired ceramic layers comprise alumina.

16. A millimeter wave filter according to Claim 13, wherein said low temperature co-fired ceramic layers are each about 5 to about 25 mils thick.

17. A millimeter wave filter according to Claim 13, wherein said ground plane layer comprises one of a layer of gold or silver.

18. A millimeter wave filter according to Claim 13, wherein said hairpin resonators folded back upon themselves form a filter that is about 320 mil x 320 mil.

19. A millimeter wave filter according to Claim 13, and further comprising a plurality of low temperature co-fired ceramic layers and interposed ground plane layers to form a multilayer low temperature co-fired ceramic substrate board, and a plurality of millimeter wavelength hairpin resonators formed on the ceramic layers and each folded back upon themselves into parallel resonator lines.

20. A millimeter wave filter according to Claim 13, and further comprising a dielectric cover positioned over said outer filter surface.

21. A millimeter wave filter according to Claim 20, wherein said dielectric cover includes a metallized interior surface spaced from said resonators for generating a predetermined cut-off frequency.

22. A method for forming a millimeter wave filter for surface mount applications comprising the steps of:
forming at least one low temperature co-fired ceramic layer having an outer filter surface; and

forming on the outer filter surface a plurality of parallel, coupled line millimeter wavelength hairpin resonators, each formed from a single stripline or microstrip and each folded back upon itself into substantially parallel resonator lines.